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RESEARCH ARTICLE

TURNOVER OF INFORMATION TECHNOLOGY PROFESSIONALS: A NARRATIVE REVIEW, META-ANALYTIC STRUCTURAL EQUATION MODELING, AND MODEL DEVELOPMENT[1]

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Abstract

This study combines a narrative review with meta-analytic techniques to yield important insights about the existing research on turnover of information technology professionals. Our narrative review of 33 studies shows that the 43 antecedents to turnover intentions of IT professionals could be mapped onto March and Simon's (1958) distal-proximal turnover framework. Our meta-analytic structural equation modeling shows that proximal constructs of job satisfaction (reflecting the lack of desire to move) and perceived job alternatives (reflecting ease of movement) partially mediate the relationships between the more distal individual attributes, job-related and perceived organizational factors, and IT turnover intentions. Building on the findings from our review, we propose a new theoretical model of IT turnover that presents propositions for future research to address existing gaps in the IT literature.

Keywords: Turnover, turnover intention, meta-analysis, structural equation modeling, MASEM, review, IT professionals

Introduction

Turnover of information technology professionals (IT turnover) remains one of the most persistent challenges facing organizations. From the 1970s into the 1990s, IT turnover rates ranged from 15 to 33 percent in the United States (Hayes 1998), raising serious concerns among IT practitioners and scholars. In the 21st century, notwithstanding the recent trend of relocating IT jobs offshore, IT turnover remains a chronic

problem (Adams et al. 2006). The problem worsens as the IT labor market tightens due to continuing decline in the supply of IT graduates, baby boomers retiring from the IT workforce, and the exponential growth of IT applications in organizations (Hecker 2005).

In response to these concerns, over 30 research studies have been conducted on IT turnover in the last two decades. Despite this large body of literature, there is no systematic review of the topic for collective understanding or to identify critical gaps in the literature. To this end, we employ both a narrative and meta-analytic approach to review and reflect on our accumulated knowledge on IT turnover, with the aim of providing future research directions to enhance our understanding of the IT turnover phenomenon.

This paper is organized into three main sections. First, we present a narrative review which covers a brief overview of major turnover theories in the extant management literature, followed by a narrative review and synthesis of studies on IT turnover. Second, we conduct a quantitative review of the literature using meta-analytic techniques. The quantitative review comprises three steps. First, we establish the magnitude of bivariate relationships between turnover intention and its antecedents. Next, we conduct a series of moderator analyses to assess the extent to which empirical results vary across different studies. And finally, we test our proposed structural model of turnover intentions of IT professionals (IT turnover intention) with the aid of meta-analytic structural equation modeling (MASEM). In the third section of this paper, we integrate the findings from the narrative review and MASEM to propose a new theoretical model of IT turnover. The aim is to build a model of IT turnover that guides future research to address important gaps in existing IT turnover research.

Narrative Review

We begin our narrative review by providing a brief overview of major turnover theories in the extant management literature. We then review the studies on IT turnover in the IT discipline, and map the antecedents examined in the literature onto a structural model built on March and Simon's (1958) theory of organizational equilibrium.

Turnover Theories

Many theories have been advanced to explain why employees voluntarily leave their organizations. These include the theory of organizational equilibrium (March and Simon 1958); the met expectations model (Porter and Steers 1973); the linkage model (Mobley 1977; Mobley et al. 1978); the unfolding model of turnover (Lee and Mitchell 1994; Lee et al. 1999; Lee et al. 1996); and the job embeddedness theory of turnover (Mitchell and Lee 2001). We provide only a brief review here as several extensive reviews of these theories exist (Griffeth and Hom 1995; Maertz and Campion 1998; Mitchell and Lee 2001; Mobley et al. 1979; Mowday and Sutton 1993).

Organizational Equilibrium Theory. Perhaps the most influential is the theory of organizational equilibrium by March and Simon (1958). March and Simon argue that turnover occurs when individuals perceive that their contributions to an organization exceed the inducements they receive from that organization. This inducement–contribution balance is broadly influenced by two factors: (1) one's desire to move, which is generally a function of one's satisfaction with the work environment, and (2) one's ease of movement, which is influenced by macro- and individual-level factors that determine employability.

Many subsequent turnover theories build on March and Simon's model. They either expand on the determinants of desire to move and ease of movement (see Porter and Steers 1973; Price 1977) or theorize mechanisms that explain turnover decisions (see Cohen and Hudecek 1993; Hom et al. 1992; Porter et al. 1976).

Met Expectations Theory. Building on the organization equilibrium theory of turnover, Porter and Steers (1973) posit that met expectations are a key determinant in turnover decisions. The concept of met expectations is defined as "the discrepancy between what a person encounters on the job in the way of positive and negative experiences and what he expected to encounter" (p. 154). The set of expectations a person has of an employer may include rewards, advancement, and relations with peers and supervisors. Specifically, Porter and Steers argue that dissatisfaction arising from the employer failing to meet a set of expectations is likely to cause turnover by an individual.

Linkage Model. Mobley's (1977) linkage model (see also Mobley et al. 1978), which has received substantial empirical support in the management literature (e.g., Hom et al. 1992), proposes a series of intermediate linkages between job satisfaction and turnover. Specifically, job dissatisfaction is proposed to trigger a series of withdrawal cognitions (e.g., thoughts of quitting, job search utility evaluations, and job search intentions) that result in job search behaviors. When an alternative job is found and evaluated as more attractive than the current job, an individual develops an intention to quit and, consequently, leaves the organization.

Unfolding Model of Turnover. In more recent research, Lee and Mitchell (1994) propose an unfolding model of turnover which adopts a more naturalistic approach to making turnover decisions. This model highlights four different psychological paths that people take when quitting. Specifically, Lee and Mitchell propose that the process of turnover is often triggered by a shock, an event that jars employees toward deliberate judgments about their jobs. The shock is then interpreted and integrated into the person's system of beliefs and images. When a shock triggers the enactment of a preexisting plan of action, the person quits without considering personal attachment to the organization or job alternatives. Alternatively, if a shock does not trigger a preexisting script, the person undergoes additional cognitive deliberations, such as evaluations of job satisfaction and job alternatives. Thus, a major contribution of the unfolding model is the incorporation of an "impulsive" route to quitting, in addition to the rational decision-making process proposed in traditional turnover models.

Job Embeddedness Theory. While the unfolding model examines how and why individuals make the decision to leave an organization, it does not directly address why some individuals are reluctant to quit (Mitchell and Lee 2001). Accordingly, Mitchell et al. (2001) advance the job embeddedness theory of turnover to argue that individuals stay with their organizations because they are enmeshed in a web that prevents them from quitting their jobs. Individuals are embedded when they have strong links with people or activities, have better fit with their jobs and communities, and need to make greater sacrifices if they leave their organizations. Unlike most turnover theories, job embeddedness theory includes nonwork factors that affect individuals' ease of leaving an organization or a community. Research shows that job embeddedness explained additional variance in voluntary turnover beyond that explained by traditional antecedents such as organizational commitment, job satisfaction, and job alternatives (Mitchell et al. 2001).

In summary, most traditional turnover theories could be traced to March and Simon's theory of organizational equilibrium. Mobley (1977), for example, extends March and Simon's theory by explicating the withdrawal cognition and job search behaviors between job satisfaction and turnover. In particular, Mobley highlights the proximal relationship between turnover intention and turnover behavior that provides the basis for this study's focus on turnover intention. The unfolding (Lee and Mitchell 1994) and job embeddedness (Mitchell et al. 2001) theories offer alternative perspectives, suggesting that not all individuals leave because they are dissatisfied, or because they find better jobs. Rather, turnover can occur impulsively and can be precipitated by events that are unrelated to work.

Narrative Review of IT Turnover

Sources of Data

While the previous section reviewed the major theories in the turnover literature, this section reviews the IT research on turnover. To this end, we searched electronic databases (e.g., ACM Digital Library and EBSCOhost) and hard-copy issues of information systems journals listed on the ISWorld's journal page (http://catt.bus.okstate.edu/isworld/journal2.htm), up until September 2005. To avoid biasing results toward published studies (Hunter and Schmidt 1990; Rosenthal and DiMatteo 2001), we sent out requests on various listservs (e.g., ISWorld, OCIS, SIGMIS-CPR) for working and unpublished papers, and papers in press or under review at journals.

The search yielded 51 papers examining turnover of IT professionals. We removed 18 conference papers that were subsequently published in journals to avoid double counting. The resulting 33 studies formed the body of our literature review of IT research on turnover.

Of these studies, only two have examined actual IT turnover behaviors (Bartol 1983; Josefek and Kauffman 2003), with the remaining studies focused on the turnover intentions of IT professionals. Since intention is a well established psychological precursor to behavior in psychology (Fishbein and Ajzen 1975) as well as in turnover research (Hom et al. 1992; Mobley et al. 1978), the considerable body of research on IT turnover intentions represents an important first step toward understanding IT turnover behavior. For instance, empirical results from turnover studies have shown that turnover intention is a stronger predictor of actual turnover compared to other antecedents such as job satisfaction. In Hom et al.'s (1992) meta-analysis, turnover intention had an estimated population correlation of 0.36 with actual turnover.

Classification of Antecedents

Based on the 31 studies on IT turnover intentions, we identified a total of 43 conceptually distinct antecedents. We organized these 43 distinct antecedents into 6 broad categories (see Table 1). The first two categories are based on March and Simon's concepts of desire to move and ease of movement. Specifically, individuals' positive evaluations of their job, organization, and career (job and career satisfaction, organizational and professional commitment) reflect the lack of desire to move, whereas individuals' perceived job alternatives reflects ease of movement.

Table 1. List of Reviewed Constructs Examined in IT Studies on Turnover Intention

Constructs	Definition	Positive[†]	Negative	Nonsignificant
Desire to Move				
1. Affective Commitment	Extent of emotional attachment to an organization (Mathieu and Zajac 1990)		11	
2. Career Satisfaction	Extent of contentment with one's career progress (Igbaria, et al., 1994)		2	
3. Continuance Commitment	Perceived costs associated with leaving an organization (Pare et al. 2000)		1	1
4. Job Satisfaction	Affective attachment to a job (Tett and Meyer 1993)		16	
5. Professional Commitment	Strength of identification with and involvement in one's profession (Morrow and Wirth 1989)			1
Ease of Movement				
6. Perceived Job Alternatives	Perceived ease of moving between employers (March and Simon 1958)	5		
Job Search				
7. Job Search	Behavior in seeking alternative employment	1		
Individual Attributes				
Demographics				
8. Age			4	5
9. Gender		4		6
10. Marital Status			1	1
Human Capital				
11. Education	Attained level of formal training	4		2
12. IT Tenure	Length of stay in the IT profession		2	1
13. Organization Tenure	Length of stay in the organization	1	5	4
Motivation				
14. Achievement Need Strength	Individual's drive for success (Lee 2001)			1
15. Career Orientations	Career aspirations which define an individual's self concept (Igbaria et al. 1995)	2	2	2
16. Constriction of Control	Narrowing one's span of control (Joseph and Ang 2001)		1	
17. Growth Need Strength	Need for challenge and achievements (Lee 2000)			1
18. Negative Affect	Tendencies toward negative emotion and cognition (Cropanzano et al. 1993)	1		
19. Restriction of Information Processing	Narrowing one's field of attention (Joseph and Ang 2001)		1	
20. Social Affiliation Needs	Individual's desire for belongingness (Lee 2002)			1

[†]Number of studies reporting this finding. A list of articles studying these constructs is available from the first author.

Table 1. List of Reviewed Constructs Examined in IT Studies on Turnover Intention (Continued)				
Constructs	**Definition**	**Positive†**	**Negative**	**Nonsignificant**
Job-Related Factors				
21. Boundary Spanning Activities	Extent of activities that require interactions across functional units (Baroudi and Igbaria 1995)	1	4	
22. Job Autonomy	Degree to which job provides discretion in scheduling and executing work (Hackman and Oldham 1975)		3	
23. Job Involvement	Degree to which employee identifies with current job (Igbaria and Greenhaus 1992)		1	
24. Job Performance	Performance on various job criteria (Murphy and Shiarella 1997)		1	1
25. Motivating Potential Score	Summary index reflecting job's overall motivating potential (Lee et al. 2000)		1	
26. Organizational Citizenship Behavior	Behaviors above and beyond that prescribed by role (Paré et al. 2001)		1	
27. Role Ambiguity	Extent of uncertainty about expectations of one's role (Cook et al. 1981)	8		1
28. Role Conflict	Extent of incompatibility of role demands (Cook et al. 1981)	8	1	
29. Task-Based Rewards	Extent of job elements motivating an individual (Igbaria et al. 1994)		2	
30. Threat of Professional Obsolescence	Extent of threat experienced due to advancements in IT profession (Joseph and Ang 2001)	1		
31. Workload	Perceived quantitative work demands (Moore 2000)	2		
32. Work Exhaustion	Depletion of emotional and mental energy to meet job demands (Moore 2000)	2		
33. Work-Family Conflict	Inter-role conflict between demands of work and family (Gutek et al. 1991)	1		
Perceived Organizational Factors				
34. Career Plateau	Extent to which job is challenging (Igbaria and Greenhaus 1992)		1	
35. Fairness of Rewards	Perception of equity in rewards allocation (e.g., Moore 2000)		6	
36. Hierarchical Position	Level in an organization's hierarchy		3	
37. Human Resource Practices	Organization's processes in managing and developing employees (Agarwal and Ferratt 2002)		1	1
38. Organization-Based Rewards	Extent to which organizational factors motivate an individual (Igbaria et al. 1994)		2	
39. Pay	Salary obtained in the course of work		6	
40. Procedural Justice	Perceived equity of processes determining performance outcomes (Paré et al. 2001)			1
41. Promotability	Likelihood of promotion (Baroudi and Igbaria 1995)		5	
42. Social Support	Availability and quality of helping relationships (Lee 2002)		1	
43. Socialization Tactics	An organization's socialization practices (King and Xia 2001)		1	1

†Number of studies reporting this finding. A list of articles studying these constructs is available from the first author.

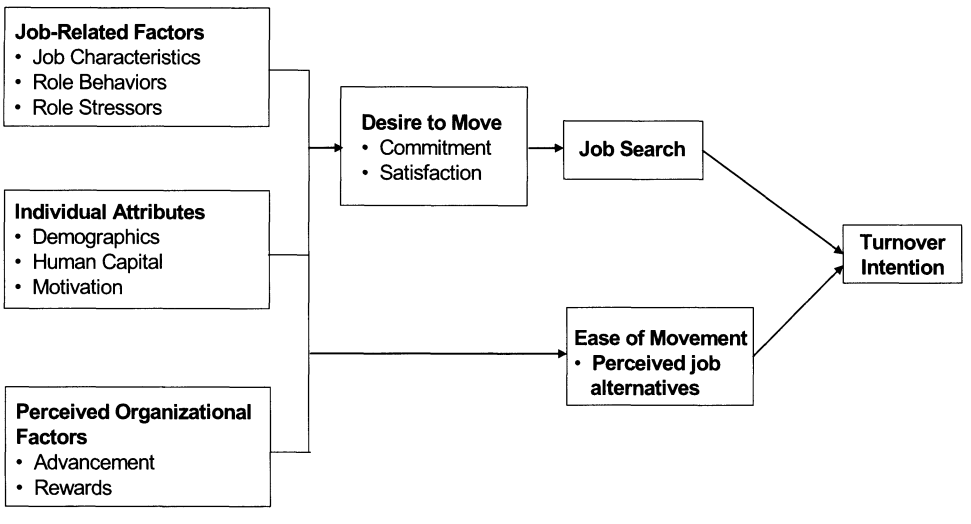

Figure 1. Proposed Structural Model Based on March and Simon and Extended from Narrative Review

The third category, job search, is based on Mobley's (1977) process model on withdrawal cognitions and job search behaviors. The fourth category describes individual attributes, which could be further classified into three subcategories (see Judge et al. 1995): demographics (age, gender, marital status), human capital (education, IT and organization tenure) and motivation constructs (e.g., achievement need strength, career orientation, negative affect).

The fifth and sixth categories are job- and organization-related factors respectively (see Porter and Steers 1973). Job-related factors refer to individuals' job activities and characteristics (e.g., boundary spanning activities, job autonomy, job involvement, motivating potential of the job, role ambiguity, and role conflict) and role behaviors (e.g., job performance, work load, and work exhaustion). Perceived organizational factors refer to conditions in the organization that may embed employees in their jobs (see Mitchell et al. 2001). These factors include advancement prospects (or career plateau), pay, reward systems, social support, and socialization tactics.

The findings for the relationships between these 43 antecedents and turnover intention are summarized in Table 1. We map the categories of antecedents reviewed above onto a structural model premised on March and Simon's theory of organizational equilibrium to explain turnover of IT professionals. But, given the dearth of studies examining actual turnover behavior, we propose a structural model of turnover intention in Figure 1, and discuss the various relationships in the next section.

Proposed Structural Model of IT Turnover Intention

Our proposed structural model is premised on and extends March and Simon's model, and the general heuristic governing relationships between distal and proximal constructs. Distal constructs are those that exert an "indirect effect" on the criterion construct (i.e., turnover intention), while proximal constructs are those that exert a more "direct effect" on the criterion (Kanfer 1991). Accordingly, we argue that constructs describing individuals, jobs, and organizations are distal antecedents that will influence the more proximal psychological constructs of desire to move and ease of movement, which in turn affect turnover intention (March and Simon 1958).

Proximal Factors

Empirically, several meta-analyses have demonstrated that desire to move, manifested in constructs such as job satisfaction and organizational commitment, are important intervening constructs in turnover models (e.g., Gaertner 1999; Hom and Griffeth 1995; Mowday et al. 1982; Price and Mueller 1986). However, no meta-analysis has yet assessed ease of movement as the other path through which more distal factors can influence turnover intention. Based on March and Simon's theory, we expect desire to move (low job satisfaction) and ease of movement (perceived job alternatives) to be positively related to turnover intention. Based on Mobley's (1977) turnover model, we also argue that job

search will mediate the relationship between desire to move and turnover intention (e.g., Hom et al. 1992). Below, we review the IT literature on the distal antecedents of turnover intention, and propose their relationships with desire to move and ease of movement based on our structural model.

Distal Factors

Individual Attributes. IT research on turnover has studied three major classes of individual attributes: demographics, human capital, and motivation.

Demographics: The demographics examined in IT research on turnover are age, gender, and marital status. IT turnover studies have typically examined age and marital status as control variables and hence are silent on their theoretical linkages with turnover intention (e.g., Ahuja et al. 2002; Gallivan 2004; Guimaraes and Igbaria 1992; Igbaria and Siegel 1992; Moore 2000). Our structural model proposes that these demographics are related to turnover intention through both desire to move as well as ease of movement.

We argue that the effect of age on desire to move is debatable in the IT context. Career stage and development theories (e.g., Levinson et al. 1978; Miller and Form 1951) argue that older employees are more satisfied with their jobs and organizations, and hence have lower desire to move. The underlying rationale is that many upper level administration opportunities are available to older rather than to younger employees, thus increasing the prestige and confidence associated with advancing age (Miller and Form 1951). However, given the changing IT technology context and skills sets, older IT professionals may experience less job satisfaction than their younger counterparts (Kacmar and Ferris 1989; Regev 1998; Sturman 2003). This is because the reduced productivity of older employees may result in them not being able to cope with the demands of work (Gist et al. 1988; McEvoy and Cascio 1989), such as updating their skills to keep pace with the changing technology context.

For ease of movement, we expect age to have a negative relationship. Adult development studies indicate that as individuals age, they pass through different development stages affecting employment priorities (Veiga 1983). For example, individuals may experience more constraints in leaving the organization as family responsibilities (e.g., care for children or parents) increase with age, thus reducing ease of movement (Finegold et al. 2002). Moreover, the general stereotype that older employees are more vulnerable to obsolescence (Gist et al. 1988) is likely to lower the perception of alternative employment for IT professionals.

Likewise, we argue that marital status is negatively related to IT turnover intention because married employees are likely to have greater financial burdens (Doran et al. 1991), and need to consider their spouses' employment, compared to their single counterparts. These additional considerations are likely to result in less desire to move and lower ease of movement.

In contrast to age and marital status, gender has received more substantive interest in IT research on turnover. IT scholars have generally argued that female IT professionals experience greater desire to move because of restricted opportunities in promotions (Baroudi and Igbaria 1995; Igbaria and Chidambaram 1997). Female IT professionals are also likely to perceive less ease of movement because of the fewer opportunities or resources (Ahuja 2002) to develop their skills and careers, as well as the general stereotype of IT as a male-dominated profession (Ahuja 2002; Baroudi and Igbaria 1995; Igbaria and Chidambaram 1997). These arguments are consistent with the extant gender research showing that women tend to hit a glass ceiling because of greater structural barriers and fewer work opportunities (Gutek 1993), resulting in less job satisfaction and loyalty to their organizations (Stroh and Reilly 1997). Based on these arguments, we propose that female IT professionals are more likely to perceive greater desire to move (i.e., less job satisfaction) and lower ease of movement.

Human Capital: The human capital variables examined in IT research are education, IT tenure, and organization tenure. IT studies have tended to treat these variables as control factors rather than as substantive factors to predict turnover intention (Igbaria and Greenhaus 1992; Moore 2000).

We propose that human capital factors should affect IT turnover intention via ease of movement, although the direction of the effect is debatable in the IT context. Based on traditional human capital theory (Becker 1975) and market signaling theory (Spence 1973), we expect human capital to be positively related to ease of movement. Human capital theory argues that individuals' education and experience render them more marketable, and thus more able to turnover. Likewise, market signaling theory suggests that because individuals' productivity is generally not observable to potential employers, individual attributes that provide the market with information indicative of productivity can influence one's employability. Thus, by these theories, individuals' education (Trevor 2001), IT and organization tenure (Josefek and Kauffman 2003) should be positively related to ease of movement as these attributes reflect individuals' productivity and hence should enhance their marketability.

On the other hand, the theory of professional obsolescence (Ang and Slaughter 2000; Dubin 1990) argues for a negative

relationship between human capital and ease of movement for IT professionals. This is because rapid and frequent changes in the technology landscape tend to erode the human capital held by IT professionals. Hence, IT professionals with long tenure in the profession and organization are likely to be professionally obsolete. Threatened by professional obsolescence, individuals cope by ignoring new technologies and narrowing their professional referent group to those with similar competencies (Pazy 1994). These maladaptive behaviors reduce the need for updating (Schambach 1994) and consequently narrow the IT job alternatives, thus leading to lowered ease of movement (Joseph and Ang 2001).

We do not expect human capital to relate to desire to move, since one's productivity is unlikely to affect job satisfaction or organizational commitment directly.

Motivation: Finally, motivation factors refer to individuals' attributes that affect the direction, intensity, and persistence of their efforts at work (see Kanfer 1991). IT research examining the influence of individuals' motivation factors have typically argued for direct relationships with turnover intention (e.g., restriction of information processing, Joseph and Ang 2001; or negative affectivity, Moore 2000). Drawing on the broader management literature, we propose that individuals' motivation factors affect turnover intention through both desire to move and ease of movement. For instance, research has found that negative affect has a negative relationship with job satisfaction and organizational commitment for individuals (Thoresen et al. 2003) because negative affect leads individuals to pay more attention to negative stimuli, and/or influences the objective likelihood of encountering negative experiences. Other motivation constructs such as career orientation and need for achievement may influence individuals' turnover intentions via ease of movement. For instance, those who place greater emphasis on their careers and who desire to get ahead are more likely to have achieved greater career success (Judge et al. 1995), which should in turn lead to greater ease of movement.

Job-Related Factors. IT research has examined three broad categories of job-related factors: job characteristics, role behaviors, and role stressors. These job-related factors are examined as both direct, as well as indirect antecedents of turnover intention, mediated by job satisfaction. For example, Moore (2000) reported a positive direct effect of work exhaustion on IT turnover intention; Lee (2000) found that the effects of role ambiguity, role conflict, and the motivating potential of a job on IT turnover intention were mediated through job satisfaction; Guimaraes and Igbaria (1992) similarly found that boundary spanning activities affect turnover intention indirectly via job satisfaction and organizational commitment.

Boundary Spanning Activities: In our proposed structural model, we argue that boundary spanning activities influence turnover intention via desire to move, although existing research has found mixed relationships. Boundary spanning activities may reduce job satisfaction because of greater role stress (Kahn et al. 1964), or it may increase job satisfaction because of potential benefits such as acquisition of information and resources (Au and Fukuda 2002).

Role Stressors: Drawing on role stress theory (Kahn et al. 1964), we argue that role ambiguity and role conflict should reduce job satisfaction (Jackson and Schuler 1985) and hence increase one's intention to turnover. Similarly, factors such as workload should be positively related to turnover intention via reduced job satisfaction because of work exhaustion (Bakker et al. 2005) and work-family conflict (Greenhaus et al. 1997). Conversely, job factors such as job autonomy and involvement should be negatively related to turnover intention via enhanced job satisfaction because of enhanced intrinsic motivation (Jackson and Schuler 1985).

Job Performance: We also argue that role-related behaviors such as job performance should be negatively related to turnover intention through enhanced job satisfaction. This is based on research that has argued and demonstrated that high performers tend to receive greater rewards (Dreher 1982; Martin et al. 1981), and hence should be more satisfied.

Perceived Organizational Factors

Pay and Advancement: Individuals' perceptions of their organizations can affect their decision to stay with, or leave the firm (Mitchell et al. 2001). In existing IT studies, perceived organizational factors that have been examined include advancement-related constructs (i.e., promotability and hierarchical position) and rewards (i.e., fairness of rewards, organization-based rewards and pay). Both promotability and hierarchical position were examined for their direct relationships with turnover intention (Igbaria and Siegel 1992). In contrast, fairness of rewards, organization-based rewards, and pay were examined for their direct effects (Igbaria and Siegel 1992), as well as indirect effects on turnover intentions, mediated via job satisfaction (Paré et al. 2000).

Sacrifice, Fit, and Links: For our model, we draw on job embeddedness theory to propose that these perceived organizational factors affect turnover intention via both desire to move and ease of movement (Mitchell et al. 2001). Specifically, we argue that individuals' advancement, hierarchical position, and rewards in the firm can influence the degree of sacrifice if they leave the organization. Other organization-

related factors such as fairness of rewards and human resource practices may affect individuals' fit with the firm, while social support and work unit size may influence the number of links individuals have with others in the organization. All these factors can increase individuals' embeddedness within the organization (Mitchell et al. 2001). These factors, in turn, will reduce the desire of individuals to move, as they enjoy the benefits provided by their organization, and will reduce their ease of movement by increasing their attachment to their current employment. Supportive of these arguments, Mitchell et al. (2001) found that job embeddedness was positively related to job satisfaction and organizational commitment, and negatively related to ease of movement.

To recapitulate, we developed a model that positions desire to move and ease of movement as two proximal mechanisms that mediate the impact of various distal antecedents on turnover intention. Our model posits that different antecedents are likely to influence turnover intention through different mechanisms. Our model also highlights some complex and ambivalent relationships for human capital and demographic variables with IT turnover intentions. For instance, we argued that gender may relate positively with desire to move, but negatively with ease of movement. This may explain why existing empirical results for gender and IT turnover intention have been mixed.

Summary of the Narrative Review

Although the field has accumulated a considerable body of findings on turnover, there is to-date no systematic review or integration of this literature. In reviewing the IT turnover literature, we make four observations. First, most studies focused on predicting turnover intention, leaving a major gap in our understanding of actual IT turnover behavior. Second, research on antecedents of IT turnover intention is fairly broad, with as many as 43 antecedents being examined and reported in the literature. However, a number of these antecedents have been examined only once, making knowledge accumulation difficult. Third, although the antecedents of turnover intention in the IT literature are largely similar to those in the management literature, there are antecedents germane to the IT profession, such as boundary spanning activities, IT (or professional) tenure, professional obsolescence, and professional commitment. Unfortunately, the constructs which could provide unique explanation for IT turnover are mostly under-studied and were excluded from our subsequent meta-analysis. Fourth, virtually all of the studies rely implicitly or explicitly on March and Simon's theory, which focuses on the psychological constructs of desire to move and ease of movement in explaining turnover intention. Recent developments in turnover theories, such as the unfolding model and the job embeddedness theory, have not received attention in the IT literature. Taken together, these four observations have important implications for future turnover research in IT, which we discuss later. We now proceed to the second section of this paper, which reports a quantitative review of IT turnover intention.

Meta-Analytic Review

In this meta-analysis, we first seek to establish the existence and magnitude of an antecedent's effect on IT turnover intention. Next, we conduct a moderator analysis to examine the extent to which results vary across studies. Recall that our narrative review finds several inconsistent (e.g., organization tenure and role conflict) and inconclusive (e.g., age and gender) findings (see Table 1). For example, some IT studies reported positive relationships for boundary spanning activities, organization tenure, and task-based rewards with IT turnover intentions, while others reported negative relationships. Likewise, some studies found significant correlations for age, gender, and education with IT turnover intent while others reported nonsignificant relationships. Even when there is consensus in the direction, the strength of the relationship could vary. Thus, a moderator analysis aims to identify the potential sources of variation that could affect the direction and magnitude of these relationships.

Our third and final objective of the meta-analytic review is to test our proposed structural model (Figure 1). To do so, we use recent innovations in meta-analysis that combine meta-analytic techniques with structural equation modeling (SEM) to test for structural paths (Viswesvaran and Ones 1995). This meta-analytic SEM (commonly known as MASEM) technique allows researchers to conduct a more precise and theory-driven quantitative review. Another major advantage of MASEM is that not all relationships specified by theory need to be examined in each primary study, because the population correlations required can be meta-analytically computed (Viswesvaran and Ones 1995).

Our meta-analysis is based on 26 papers (indicated by an asterisk in the "References" section). We dropped 5 of the 31 papers on turnover intentions reviewed in the narrative review because we were unable to obtain key information of each paper from the authors to conduct a meta-analysis (e.g., sample size, correlations with turnover intention, F-values, t-values, and chi-square statistics). We further excluded 19 of the 43 antecedents reviewed earlier because these 19 antecedents were studied only once. This resulted in 24 antecedents that could be meta-analyzed.

Meta-Analysis of Bivariate Relationships

We estimated the magnitude of population correlations by first coding each study for zero-order effect sizes in the form of correlations (or other reported statistics such as F- or t-values or chi-square statistics, which can be transformed to correlations using Hunter and Schmidt's [1990] formulae), sample size, and reliability statistics (i.e., Cronbach alpha). Following the coding, we computed the population correlation estimates using Hunter and Schmidt's meta-analysis program (revised by Hunter in 1998). To account for sampling error, we weighted each observed correlation from a primary study by its sample size. To account for measurement error, we used correlations that were adjusted individually for unreliability. In cases where reliability statistics were not reported, we adjusted using Hunter and Schmidt's artifact distribution method (p. 158).

Table 2 presents results for the meta-analysis of bivariate correlations. Of the 24 antecedents included in our meta-analysis, 15 were significantly related to IT turnover intention. With the exception of continuance commitment ($\rho = 0.04$, $p = n.s.$), all proximal antecedents reflecting desire to move and ease of movement were significantly related to IT turnover intention: affective commitment ($\rho = -0.46$, $p < 0.05$), career satisfaction ($\rho = -0.35$, $p < 0.05$), job satisfaction ($\rho = -0.53$, $p < 0.05$) and perceived job alternatives ($\rho = 0.30$, $p < 0.05$).

Of the demographics, only marital status ($\rho = -0.10$, $p < 0.05$) was significantly related to IT turnover intention; age ($\rho = -0.09$, $p = n.s.$) and gender ($\rho = -0.04$, $p = n.s.$) were not significant. Of the human capital factors, only IT tenure ($\rho = -0.29$, $p < 0.05$) was significantly related to IT turnover intention. The relationships with education ($\rho = 0.04$, $p = n.s.$) and organization tenure ($\rho = -0.08$, $p = n.s.$) were not significant.

Other than task-based rewards ($\rho = -0.26$, $p = n.s.$), all of the job-related factors were significantly related to IT turnover intention: boundary spanning activities ($\rho = -0.16$, $p < 0.05$), job autonomy ($\rho = -0.33$, $p < 0.05$), job performance ($\rho = -0.23$, $p < 0.05$), role ambiguity ($\rho = 0.21$, $p < 0.05$), role conflict ($\rho = 0.30$, $p < 0.05$), workload ($\rho = 0.22$, $p < 0.05$), and work exhaustion ($\rho = 0.45$, $p < 0.05$).

Of the perceived organizational factors, only fairness of rewards ($\rho = -0.38$, $p < 0.05$) and hierarchical position ($\rho = -0.28$, $p < 0.05$) were significantly related to IT turnover intention. The relationships with organization-based rewards ($\rho = -0.22$, $p = n.s.$), pay ($\rho = -0.13$, $p = n.s.$) and promotability ($\rho = -0.13$, $p = n.s.$) were not significant.

Moderator Analyses

We then conducted moderator analyses to examine sample and study characteristics that may account for variation across studies. These characteristics, known as moderators, may potentially explain why inconsistent results across studies occur (Lipsey 1994). We were able to examine the following moderators: age and gender ratio of sample, conceptualization and operationalization of turnover intention, and operationalization of antecedents (see Appendix A).

Results of the moderator analyses shed some light on the non-significant relationships for some antecedents with IT turnover intention (see Appendix A). For instance, our moderator analyses showed that young men were more likely to leave compared to young female IT professionals, and could explain why gender did not have a significant bivariate relationship with IT turnover intention. Likewise, organization tenure did not have a significant relationship with IT turnover intention possibly because its effect depended on the age of the IT professionals. Our results showed that organization tenure had a positive relationship with turnover intention in samples of younger IT professionals, but a negative relationship in samples of older IT professionals. Younger IT professionals appear to experience lower "sunk costs" or fewer problems in adjusting to a new workplace than older IT professionals.

Meta-Analytic Structural Equation Modeling (MASEM)

Following the MASEM procedure outlined by Viswesvaran and Ones (1995), we first estimated the true score population correlations between all pairs of variables in our meta-analysis to obtain a meta-analytically derived correlation matrix. This correlation matrix is the input required for SEM analyses. We dropped 10 variables from the correlation matrix (career satisfaction, continuance commitment, marital status, IT tenure, job autonomy, task-based rewards, workload, work exhaustion, fairness of rewards, and organization-based rewards) because these variables had a large number of missing relationships. Dropping these variables minimizes the likelihood of imputing "out-of-bound" correlations with other variables in the matrix (Cheung and Chan 2005; Shumacker and Lomax 2004). We also removed two more variables to minimize multicollinearity in our model, hierarchical position because it was highly correlated with pay ($r = 0.82$) and organizational commitment because it was highly correlated with job satisfaction ($r = 0.64$). We chose to retain job satisfaction instead of organizational commitment because it better reflects March and Simon's original conceptualiza-

Table 2. Meta-Analysis of the Antecedents of Turnover Intention

Antecedents	K	N	ρ	95% Confidence Interval		Q	Moderators†				
				Lower	Upper		Age of Sample	Gender Ratio	Stay/ Quit	Turnover Measures	Construct Measures
Desire to Move											
1. Affective Commitment	12	2,417	–0.46*	–0.57	–0.34	121.58***	✓			✓	✓
2. Career Satisfaction	2	576	–0.35*	–0.35	–0.36	0.01					
3. Continuance Commitment‡	2	381	0.04	–0.21	0.28	8.72***					
4. Job Satisfaction	15	2,919	–0.53*	–0.59	–0.47	6.75					
Ease of Movement											
5. Perceived Job Alternatives	4	876	0.30*	0.16	0.44	17.96***	✓			✓	✓
Demographics											
6. Age	10	2,428	–0.09	–0.20	0.03	84.25***				✓	✓
7. Gender	10	2,751	–0.04	–0.05	0.12	42.76***	✓				✓
8. Marital Status	2	635	–0.10*	–0.14	–0.06	0.58					
Human Capital											
9. Education	6	1,860	0.04	–0.03	0.12	12.54***	✓	✓		✓	✓
10. IT Tenure	3	930	–0.29*	–0.38	–0.20	5.29					
11. Organization Tenure	11	3,142	–0.08	–0.19	0.03	107.86***	✓	✓		✓	✓
Job-Related Factors											
12. Boundary Spanning Activities	5	1,325	–0.16*	–0.23	–0.09	7.32					
13. Job Autonomy‡	3	616	–0.33*	–0.46	–0.20	7.54*					
14. Job Performance‡	2	850	–0.23*	–0.33	–0.13	4.01*					
15. Role Ambiguity	10	2,430	0.21*	0.08	0.35	96.05***	✓	✓			
16. Role Conflict	10	2,430	0.30*	0.22	0.38	32.30***	✓	✓			
17. Task-Based Rewards‡	2	576	–0.26	–0.71	0.19	62.01***					
18. Workload	2	423	0.22*	0.11	0.32	1.98					
19. Work Exhaustion	2	423	0.45*	0.40	0.50	0.60					
Perceived Organizational Factors											
20. Fairness of Rewards	5	969	–0.38*	–0.49	–0.26	16.17***	✓				
21. Hierarchical Position‡	2	812	–0.28*	–0.39	–0.16	5.23*					
22. Organization-Based Rewards‡	2	576	–0.22	–0.55	0.10	29.84***					
23. Pay	6	1,868	–0.13	–0.29	0.02	77.33***			✓		✓
24. Promotability‡	3	983	–0.13	–0.41	0.15	63.88***					

K = Number of studies; N = Number of observations; ρ = Corrected population correlation; Q = Chi-square test for moderators; *p < 0.05; **p < 0.01; ***p < 0.001

†See Appendix A for details of moderator analysis.

‡Insufficient number of studies for moderator analyses.

tion (Griffeth and Hom 1995, p. 247). Moreover, organizational commitment is argued to be conceptually similar to turnover intention as both reflect an individual's loyalty to an organization, and hence should not be used concurrently in the same study (Price and Mueller 1981).

Next, we computed the harmonic mean of the sample sizes of all studies used in our correlation matrix (N = 701). By giving less weight to large sample sizes, the harmonic mean approach is a more conservative pooling method compared to taking the arithmetic mean or total sample size of all studies. It also gives the best approximation of the sample size for path analysis (Viswesvaran and Ones 1995).

Using the resultant correlation matrix of 13 variables, we tested a structural model where job satisfaction and perceived job alternatives mediate the relationships between distal antecedents (individual attributes, job-related factors, and perceived organizational factors) and turnover intention, as proposed in our narrative review (see Figure 1). Specifically, we estimated the following paths: all perceived organizational factors and demographics to both job satisfaction and perceived job alternatives; all job-related factors to job satisfaction only; all human capital factors to perceived job alternatives only; and paths from job satisfaction and perceived job alternatives to IT turnover intention. We allowed all variables within each category of distal factors (i.e., job-related, perceived organizational, and human capital factors) to correlate with one another. We did not correlate demographics (age and gender) given that there is no theoretical reason to do so.

We also estimated two alternative models. The first was a partially mediated model, which was similar to our proposed structural model except that direct paths were estimated for the distal antecedents and IT turnover intention (see Igbaria and Greenhaus 1992; Moore 2000). The second alternative model was a direct effects model where all antecedents were directly related to IT turnover intention. This model was similar to the previous models except that no paths were estimated between the distal and proximal antecedents. This model was set up to reflect the typical multiple regression models tested in prior IT research (Igbaria and Siegel 1992; Paré et al. 2001).

We tested the covariance matrix according to procedures suggested by MacCallum et al. (1996) to assess the robustness of the covariance matrix. We then compared the fit statistics of the fully mediated model with those of the other two models using LISREL 8.72 (Jöreskog and Sörbon 2005). To evaluate model fit, we use the standardized root-mean-square residual (SRMR, Hu and Bentler 1995), root-mean-square error of approximation (RMSEA, Steiger and Lind 1980), nonnormed fit index (NNFI, Tucker and Lewis 1973), comparative fit index (CFI, Bentler 1990), and goodness of fit index (GFI, Jöreskog and Sörbon 2005). Following traditional conventions for model fit evaluation, an acceptable fit is indicated by 0.90 and above for NNFI, CFI, and GFI (Bentler and Bonnett 1980). For SRMR, a good fit is indicated by 0.08 and below (Hu and Bentler 1998). For RMSEA, a good fit is indicated by 0.05 and below, while an acceptable fit is indicated by values between 0.05 and 0.08 (Browne and Cudeck 1993).

We conducted the chi-square difference test ($\Delta\chi^2$) to test the relative fit of alternative models to our proposed models (Byrne 1998; Kelloway 1998). Finally, we conducted a Sobel test (Sobel 1982) to formally assess whether job satisfaction and perceived job alternatives are mediators of the distal antecedents.

Results

Table 3 presents the correlation matrix for the SEM analyses. Results of the SEM showed that the partially mediated model (SRMR = 0.039, RMSEA = 0.054, power of RMSEA = 0.99, NNFI = 0.93, CFI = 0.95, GFI = 0.97, χ^2 = 160.84, df = 54) fit the data better than the fully mediated (SRMR = 0.067, RMSEA = 0.100, power of RMSEA = 0.97, NNFI = 0.66, CFI = 0.73, GFI = 0.90, χ^2 = 494.97, df = 62) and the direct effects (SRMR = 0.099, RMSEA = 0.092, power of RMSEA = 0.75, NNFI = 0.70, CFI = 0.74, GFI = 0.91, χ^2 = 462.60, df = 68) models. Moreover, the significant chi-square difference for the partially mediated compared to the fully mediated model ($\Delta\chi^2$ = 334.13, Δdf = 8, $p < 0.001$) and the direct effects model ($\Delta\chi^2$ = 301.76, Δdf = 14, $p < 0.001$) indicates that the partially mediated model fits the data best.

In our partially mediated model, the distal antecedents (demographics, human capital factors, job-related factors, and perceived organizational factors) had both direct and indirect relationships with IT turnover intention. The effects of these distal antecedents were mediated by job satisfaction and perceived job alternatives. As expected, results of parameter estimates, presented in Figure 2, indicated that job satisfaction (reflecting the lack of desire to move) was negatively related to IT turnover intent (β = –0.14, $p < 0.001$), while perceived job alternatives (reflecting ease of movement) was positively related to IT turnover intent (β = 0.44, $p < 0.001$).

For job-related factors, we argued that boundary spanning activities could be either positively or negatively related to job satisfaction, role ambiguity and role conflict will be negatively related to job satisfaction, while job performance

Table 3. Meta-Analytic Correlation Values for the Antecedents of Turnover Intention

		1	2	3	4	5	6	7	8	9	10	11	12
1	Turnover Intention	1.00											
2	Job Satisfaction	–0.53	1.00										
3	Perceived Job Alternatives	0.30	–0.15	1.00									
4	Boundary Spanning Activities	–0.16	0.15	0.24	1.00								
5	Job Performance	–0.23	0.22	0.11	0.10	1.00							
6	Role Ambiguity	0.21	–0.42	0.01	0.06	–0.11	1.00						
7	Role Conflict	0.30	–0.41	0.03	0.18	–0.11	0.13	1.00					
8	Pay	–0.13	0.22	0.20	0.31	0.26	0.00	0.05	1.00				
9	Promotability	–0.50	0.19	0.16	0.09	0.10	–0.14	–0.17	0.04	1.00			
10	Age	–0.04	0.00	–0.05	0.14	–0.17	–0.04	–0.10	0.35	–0.15	1.00		
11	Gender	0.03	0.03	–0.10	0.14	–0.32	0.18	0.11	–0.34	–0.10	0.07	1.00	
12	Education	0.04	0.04	0.12	0.03	0.16	0.07	0.05	0.76	0.20	0.23	–0.23	1.00
13	Organization Tenure	–0.08	0.09	–0.09	0.14	0.20	0.03	0.07	0.11	–0.23	0.44	0.14	–0.08

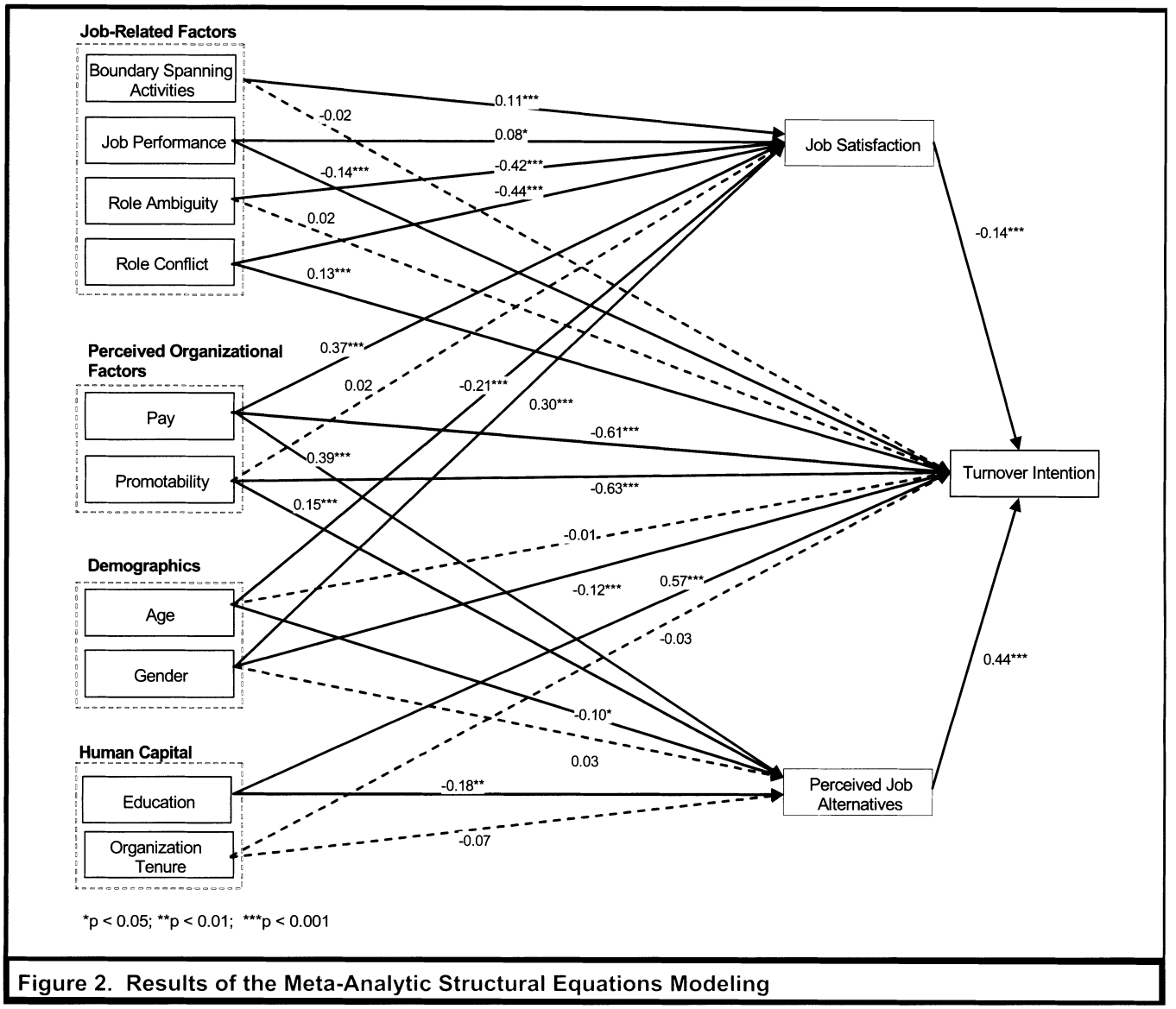

Figure 2. Results of the Meta-Analytic Structural Equations Modeling

will be positively related to job satisfaction. Results indicated that boundary spanning activities had a positive relationship with job satisfaction ($\beta = 0.11, p < 0.001$) and no direct relationship with IT turnover intention ($\beta = -0.02, p = n.s.$). Consistent with expectations, results showed that role ambiguity ($\beta = -0.42, p < 0.001$) and role conflict ($\beta = -0.44, p < 0.001$) were negatively related to job satisfaction. Role conflict also had a direct positive relationship with IT turnover intention ($\beta = 0.13, p < 0.001$), but not role ambiguity ($\beta = 0.02, p = n.s.$). Also as expected, job performance was positively related to job satisfaction ($\beta = 0.08, p < 0.05$) and, in addition, had a negative direct relationship with IT turnover intention ($\beta = -0.14, p < 0.001$).

For perceived organizational factors, we predicted that antecedents reflecting one's embeddedness in the organization (e.g., pay and promotability) will be positively related to job satisfaction and negatively related to perceived job alternatives. Results showed that pay had a positive relationship with job satisfaction ($\beta = 0.37, p < 0.001$) and perceived job alternatives ($\beta = 0.39, p < 0.001$), as well as a negative direct relationship with IT turnover intention ($\beta = -0.61, p < 0.001$). Promotability was not related to job satisfaction ($\beta = 0.02, p = n.s.$) but was positively related to perceived job alternatives ($\beta = 0.15, p < 0.001$). Promotability also had a negative direct relationship with IT turnover intention ($\beta = -0.63, p < 0.001$).

For demographics, we expected age to be either positively or negatively related to job satisfaction, and negatively related to perceived job alternatives. Results showed that age was negatively related to job satisfaction ($\beta = -0.21$, $p < 0.001$) and perceived job alternatives ($\beta = -0.10$, $p < 0.05$), and was not directly related to IT turnover intention ($\beta = -0.01$, p = *n.s.*). For gender, we argued that female IT professionals will have lower job satisfaction and fewer perceived job alternatives than men. Results, however, showed that female IT professionals reported higher job satisfaction (i.e., less desire to move, $\beta = 0.30$, $p < 0.001$), but did not differ from men in their perceived job alternatives ($\beta = 0.03$, p = *n.s.*); men generally reported stronger intention to IT turnover ($\beta = -0.12$, $p < 0.001$).

We argued that human capital factors (education and organization tenure) could either be positively or negatively related to perceived job alternatives. Results showed that education was significantly and negatively related to perceived job alternatives ($\beta = -0.18$, $p < 0.01$), supporting the professional obsolescence theory; education also had a positive direct relationship with IT turnover intention ($\beta = 0.57$, $p < 0.001$). Results for organization tenure were not supported: organization tenure was not significantly related to perceived job alternatives ($\beta = -0.07$, p = *n.s.*) nor directly to IT turnover intention ($\beta = -0.03$, p = *n.s.*).

Finally, the Sobel test indicated that job satisfaction significantly mediated the effects of the job-related factors of boundary spanning activities ($z = -2.88$, $p < 0.01$), job performance ($z = -2.32$, $p < 0.05$), role ambiguity ($z = 4.43$, $p < 0.001$), and role conflict ($z = 4.45$, $p < 0.001$); the demographic factors of gender ($z = -4.23$, $p < 0.001$) and age ($z = 3.88$, $p < 0.001$); and for the factor of pay ($z = -4.17$, $p < 0.001$) on IT turnover intention. We found that promotability ($z = -0.66$, p = *n.s.*) was not mediated by job satisfaction. Perceived job alternatives significantly mediated the effects of the perceived organizational factors of pay ($z = 6.22$, $p < 0.001$) and promotability ($z = 3.69$, $p < 0.001$); age ($z = -2.48$, $p < 0.05$) and education ($z = -2.97$, $p < 0.01$) on IT turnover intention. Perceived job alternatives did not mediate the effects of organization tenure ($z = -1.74$, p = *n.s.*) and gender ($z = 0.75$, p = *n.s.*) on turnover intentions.

Discussion of Meta-Analytic Review

Results of our meta-analytic review contributed further insights to the existing state of IT research on IT turnover intention beyond the narrative review. A basic understanding obtained from our meta-analyses is the magnitude and significance of relationships between IT turnover intention and its existing antecedents. The results of our moderator analyses, discussed in greater length in Appendix A, also shed some light on sources of inconsistencies in findings across different IT studies on turnover.

More importantly, the focal contribution of this study is the enhanced understanding of the interrelationships among existing antecedents in predicting IT turnover intention, based on our MASEM analysis of March and Simon's theory. Specifically, the results of our MASEM model showed that job satisfaction (reflecting the lack of desire to move) and perceived job alternatives (reflecting ease of movement) partially explained the relationships for individual attributes, job-related factors, and perceived organizational factors with IT turnover intention. This finding has two implications. First, it suggests the presence of unmeasured mediators besides job satisfaction and perceived job alternatives, and reinforces our call in the next section for more research examining other potential mediators.

Second, the results of the structural paths in the partially mediated MASEM model offer deeper insights into turnover intentions by IT professionals. In general, relationships for IT turnover intention with job factors (boundary spanning activities, role ambiguity, role conflict, and job performance), demographics (age and gender), and pay were explained through job satisfaction; while relationships with perceived organizational factors (pay and promotability) and education were explained through perceived job alternatives. Some of these results, however, were contrary to expectations based on general theories, suggesting the importance of considering the specific context of the IT profession. For instance, although human capital theory argues for a positive relationship between education and perceived job alternatives, our results demonstrated a negative relationship, supporting the professional obsolescence theory for IT professionals. Likewise, contrary to career stage and development theories that suggest older employees to be more satisfied with their jobs, our findings supported the alternative view that older IT professionals experience lower job satisfaction, possibly because of having to cope with the changing IT skills set required by the profession. Another interesting finding from our MASEM results was that female IT professionals reported greater job satisfaction, compared to men, thus providing little support for the common perception that female IT professionals are given fewer opportunities for interesting work, or to advance in the organization.

Besides clarifying why distal antecedents affect IT turnover intention via the more proximal psychological constructs of job satisfaction and perceived job alternatives, our MASEM results also highlight some complex relationships. For instance, our study showed that IT professionals with high pay faced a tension in their turnover intentions in the form of greater job satisfaction (lower desire to move) and greater

perceived job alternatives (higher ease of movement). This could explain why pay did not have a significant bivariate correlation with IT turnover intention. Likewise, the non-significant bivariate correlation for promotability and education with IT turnover intention could be explained by the partially mediated model, where promotability was found to have a positive indirect relationship (via perceived job alternatives), but a negative direct relationship with IT turnover intention; education had a negative indirect relationship (via perceived job alternatives) but a positive direct relationship with IT turnover intention.

Finally, the findings of our structural model highlight why it is important to make a distinction between distal and proximal antecedents of IT turnover. For instance, although the results of our bivariate meta-analysis showed that gender and age were not significantly related to IT turnover intention, our meta-analytic SEM results demonstrated that they had an indirect effect via job satisfaction (albeit in an unexpected direction). These results suggest that specifying the proximal psychological mechanisms can allow for a better understanding of the role of some distal antecedents.

We acknowledge two limitations of this meta-analysis. First, the relatively small number of studies (K = 26) that could be included in the meta-analysis precluded a number of antecedents from being examined in our meta-analytic structural model. This limitation, however, should not unduly influence our MASEM results since we were able to model the major categories of antecedents (i.e., individual attributes, job-related factors, and perceived organizational factors) of IT turnover intention, with the exception of job search. Moreover, the MASEM approach is more dependent on sample sizes than number of studies (Viswesvaran and Ones 1995).

Second, we adopted a correlation matrix, rather than a covariance matrix, to estimate the path coefficients in our structural model. The use of a correlation matrix in structural equation models may produce overestimated standard errors when the standard deviation varies across input variables (Cudeck 1989). However, since these standard errors are often overestimated (Cudeck 1989, p. 323), our significance tests of individual parameters should be more conservative (Harrison et al. 2006).

Developing a Contextual Model of IT Turnover

Both the narrative review and meta-analysis highlight three significant opportunities for future research to contribute to our collective understanding of the IT turnover phenomenon. Specifically, future IT studies could: (1) examine actual turnover behavior and its relationship with turnover intentions, (2) employ contemporary theories of turnover to enrich our current understanding of the IT turnover phenomenon, and (3) consider and incorporate the IT context into generic turnover theories.

Based on these three major areas, we propose a broad contextual model for future IT turnover research in Figure 3. This contextual model extends our earlier meta-analytic model (see boxes in bold frames in Figure 3), and incorporates future research areas that address: (1) the link between turnover intention and behavior, (2) the use of more contemporary turnover theories such as the unfolding model (Lee and Mitchell 1994) and job embeddedness theory (Mitchell et al. 2001) to explain IT turnover, and (3) antecedents that are specific to the IT context at different levels of analyses (see Ang and Slaughter 2000). We begin by offering several suggestions for future research at the individual level of analysis, focusing on turnover behaviors and psychological processes based on the unfolding model and job embeddedness theory. We then offer suggestions for future research involving cross-level effects of the IT context (at the organizational and environmental level) on individual-level relationships.

Individual Level of Analysis

Turnover Intention and Behavior

The paucity of IT turnover research examining turnover behavior poses an important gap in the literature, for both methodological and theoretical reasons. Methodologically, the use of self-reported turnover intention tends to produce inflated relationships with other self-reported constructs because of percept-percept bias. Theoretically, the strength of the relationship between intention and behavior has been found to vary across situations and groups, such as perceived employment opportunities (Mobley 1982; Steers and Mowday 1981), or the motives behind turnover intention (Vandenberg and Nelson 1999). Empirically, the unique pattern of several relationships in our current findings on IT turnover intentions vis-à-vis general turnover research may suggest that the link between turnover intentions and actual turnover found in prior turnover research may not generalize to the IT context. Therefore, using turnover intention as a proxy for turnover behavior can result in weak or inaccurate inferences at times, and point to the importance of assessing actual turnover behavior.

Hence, we suggest that a fundamental area for future IT research on turnover is to incorporate IT turnover behavior as

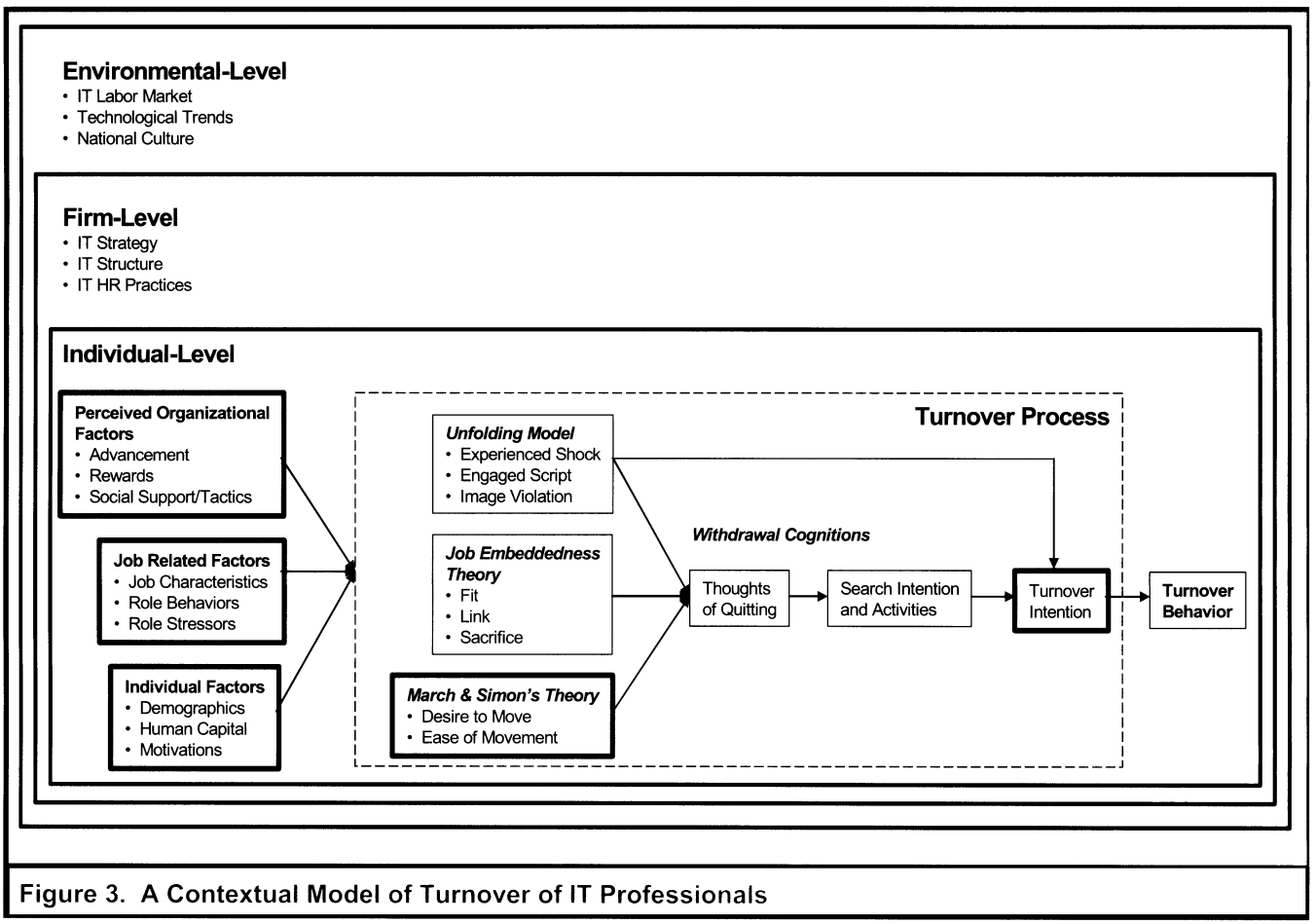

Figure 3. A Contextual Model of Turnover of IT Professionals

a focal dependent variable. This, however, does not imply that turnover intention is unimportant. In fact, a number of interesting research questions regarding the turnover intention–behavior link can be addressed. One specific direction for future research is to examine individual-level moderators of the IT turnover intention–behavior relationship. For instance, we propose that professional obsolescence is one specific individual attribute with IT relevance that may moderate the IT turnover intention–behavior relationship. We expect the relationship to be weaker for IT professionals who view themselves as more professionally obsolete, since threat-rigidity theory (Staw et al. 1981) suggests that perception of professional obsolescence poses a threat to IT professionals' identity, which in turn restricts their information processing during job search. To test this theory, a longitudinal study is needed to assess IT turnover intentions and perceptions of obsolescence through a self-report questionnaire, and actual IT turnover through a company's records at a subsequent time. This design necessitates several important methodological considerations, such as deciding on a suitable time-lag between assessment of self-reports and actual turnover, taking into account effects of the turnover base rate (Steel 2002), and using appropriate data analytical techniques such as survival analyses (Dickter et al. 1996).

Another specific direction for future IT research is to examine the understudied area of contextual moderators in the IT turnover intention–behavior link. For instance, national culture may moderate the relationship between individuals' turnover intention and actual turnover. In a tight culture, where organizational interests are upheld before personal interests (e.g., Japan), one's intention and behavior are less tightly coupled because of external pressures imposed by societal norms and values. Yet another study might examine the moderating role of organization-level factors. Organization-level factors such as employment terms and clauses (e.g., restraint of trade) could create constraints for employees who intend to leave the firm, thus attenuating the intention–behavior relationship.

Turnover Theories

Another major gap in current IT literature on turnover is the lack of alternative theoretical perspectives to explain IT turnover. Despite more recent developments in turnover theories in the last decade, IT research on turnover has relied primarily on March and Simon's theory of organizational equilibrium to explain turnover. Contemporary turnover perspectives such as the unfolding model (Lee and Mitchell 1994) and the job embeddedness theory (Mitchell et al. 2001) can offer important and new understanding of the IT turnover phenomenon, and hence present many opportunities for future research.

One major stream of research could focus on applying the unfolding model to understand factors that trigger turnover in the IT profession, and the various decision-making paths that IT professionals adopt (Lee and Mitchell 1994). Empirical research can start with basic goals of determining whether the IT turnover process reflects the various decision-making paths proposed by Lee and his colleagues (Lee and Mitchell 1994; Lee et al. 1999), and whether there is a dominant path that best describes IT professionals. For instance, what are the prototypical shocks that IT professionals generally encounter that lead to IT turnover decisions? How commonly does impulsive quitting (i.e., the direct path between shock and IT turnover intention in Figure 3) versus the more deliberate decision-making and job search process (i.e., the indirect effects of shock on IT turnover intention via withdrawal cognitions in Figure 3) occur for IT professionals? More advanced research in this area can further examine whether different types of IT professionals are more likely to adopt different decision paths, thus enhancing our understanding of the turnover process in the IT profession.

IT researchers can address these questions by conducting qualitative studies involving IT professionals who have voluntarily left their organization, to gain their retrospective accounts of what triggered their decision to leave, and the decision processes they went through. Typical interview questions may address the nature of the "shock" event (if any), the presence of an existing script for leaving (for example, "I would leave my firm if my IT skills get obsolete"), the presence of image violation (for example, compatibility of one's professional goals with company practices), satisfaction with the job and the organization, and the presence of job search activities and alternative job offers. The decision paths of these IT professionals can then be mapped onto the proposed paths in the unfolding model, and a frequency count of the paths conducted to determine whether there is a dominant path exhibited by IT professionals. Further, these studies can compare decision paths across different groups of IT professionals (e.g., men and women) to assess whether a particular attribute (i.e., gender) affects the decision-making process for turning over (see Donnelly and Quirin 2006).

Besides the unfolding model, job embeddedness theory (Mitchell et al. 2001) offers another potential area for future research. Future research can apply job embeddedness theory to examine novel psychological constructs such as perceptions of links, fit, and sacrifice to explain IT turnover. The theory is potentially important as IT professionals may choose to stay in their firm even though they are dissatisfied with their job, because of their perceived embeddedness in the organization or in the larger community. Thus, an important research question is what factors affect IT professionals' perceptions of fit and link with the organization, as well as the sacrifices associated with leaving the job? For instance, individuals with longer tenure in the organization may perceive greater links and fit with the firm; or, those with school-age children may perceive greater sacrifices if they leave the job.

A related future research direction could expand on the existing conceptualization of job embeddedness to include a professional dimension. That is, beyond examining individuals' fit, links, and sacrifices associated with work and community as proposed by Mitchell et al. (2001), IT research can also consider individuals' fit, links, and sacrifices associated with the IT profession. This stream of research is particularly relevant when we consider how IT professionals may differ in their career orientations and professional identity (Kerr et al. 1977). Such a perspective not only enriches our knowledge of IT turnover, but also helps to better understand why IT professionals turn away from the profession (Joseph 2006).

Cross Level Analysis: IT Context

A third major gap in IT turnover research is the lack of attention to the IT context. Context, defined as the surroundings associated with a phenomenon that help illuminate that phenomenon (Cappelli and Sherer 1991), typically refers to factors at a higher level of analysis than the unit of analysis under investigation (Mowday and Sutton 1993). Context is critical because it exerts important influences on individual behaviors (Cappelli and Sherer 1991) by providing constraints or opportunities (Johns 2001). Hence, turnover studies that ignore the IT context risk having inadequate, or worse, misspecified theories to explain the turnover of IT professionals.

Given the importance of context, future IT research on turnover should examine how IT-specific contextual factors

can exert cross-level influence on IT turnover intentions. We propose some specific ideas by adopting Ang and Slaughter's (2000) framework that divides the IT context into the environment and the firm. Examples of environmental-level factors are technological trends, IT labor markets, and national culture. Examples of firm-level factors include IT strategy, structure, life cycle, size, IT roles, and IT human resource practices. In the following paragraphs, we suggest some research questions that examine the cross-level effects of these contextual factors on IT turnover intentions, via the various turnover theories.

Environmental-Level Factors. One area for future research is to examine how environmental-level factors influence the turnover process for IT professionals, based on the unfolding model of turnover. A research question that is relevant to the IT profession is how changes in technological trends affect the turnover decisions of IT professionals. Such changes may have less of an impact on younger IT professionals, or those who are more committed to the profession (i.e., professional identity), because such individuals are likely to be more determined and motivated to update their skills, and hence may trigger different decision making paths according to the unfolding model. For instance, when individuals interpret the technological change as a threat, and have a preexisting script ("I will leave the organization when my skills are obsolete"), they may decide to leave the organization, or perhaps even the profession (Joseph and Ang 2001) without much deliberation. When a preexisting script does not exist, individuals engage in further decision making by considering other factors such as organizational support for skills upgrading or job alternatives.

Another example of an environmental-level factor that is worth empirical attention is the size of the IT industry. Building on the professional embeddedness idea discussed earlier, we propose that the size of the IT industry may affect one's turnover intention because of how entrenched IT professionals perceive themselves in the IT profession. For instance, we expect IT professionals employed in IT organizations where the professional content of work is central to the mission of the organization (Wallace 1995) to be more professionally embedded in countries where the IT industry is small, because of fewer employment alternatives. In such cases, IT professionals are less likely to leave their organizations for professional reasons, even in the face of a shock.

Firm Level Factors. Two recent IT turnover studies at the firm-level of analysis found that internal labor markets (Ang and Slaughter 2004) and human resource practices (Ferratt et al. 2005) influence firms' IT turnover rates. Such studies have important implications for firms in terms of their practices and design, and hence merit more attention.

Besides firms' IT turnover rates, future research could also examine how organizational practices exert cross-level effects on individuals' turnover processes. One suggestion is to examine how changes in organizational practices (e.g., withdrawing training support because of budget constraints, or outsourcing certain IT functions) may serve as a shock that could cause IT professionals to consider leaving the organization. Consistent with the unfolding model (Lee and Mitchell 1994), individuals who have a script that matches the situation (e.g., "I will quit the firm if it does not provide training to upgrade my IT skills") are likely to leave without further consideration of their attachment to the organization, or their ease of finding alternative employment.

Another proposed research area is to build upon Ferratt et al.'s (2005) study to examine whether firms' human resource practices influence IT turnover intentions via job embeddedness. Specifically, we propose that firms adopting a human capital configuration of human resource practices are more likely to increase employees' job embeddedness because of the relatively greater emphasis placed on community building, incentives, and employment security, compared to the task configuration of human resource practices. Studies addressing this research question may sample IT professionals from different firms with varied human resource practices, and adopt a hierarchical linear modeling technique to examine the cross-level effects of the firms' human resource practices on individuals' turnover intentions via perceptions of links, fit, and sacrifice.

In sum, Figure 3 proposes a broad model of IT turnover for possible future IT research directions. We hope to direct future IT research to close existing research gaps by assessing (1) IT turnover behavior, (2) newer turnover theories such as the unfolding model and job embeddedness theory, and (3) the cross-level influence of IT context on individual turnover.

Implications

Research Contributions

Our study represents the first to combine both a qualitative and quantitative review of a substantive area of research within the IS field. The narrative review and meta-analysis complement each other and highlight areas where IT research on turnover has focused its attention, and areas where more research is needed.

A second contribution of this paper is to offer theoretical coherence to the existing IT research on turnover intention.

We do so by applying March and Simon's (1958) theory to organize and specify interrelationships among the existing antecedents to explain why IT professionals develop turnover intentions (Bacharach 1989). Our study contributes to both the IT and management turnover literature by offering the first meta-analytic test of a structural model based on March and Simon's theory. Moreover, our use of MASEM (Viswesvaran and Ones 1995) offers several major advantages. In particular, the meta-analysis overcomes the problem of weak statistical power that many independent IT studies face by appropriately cumulating studies before model estimation (e.g., considers uneven sample sizes, corrects for statistical artifacts), and enabling a test of a structural model without requiring hypothesized relationships between variables to be examined in every primary study. In essence, our study combines theory building with the power of meta-analysis and SEM to review and advance IT turnover research, and to offer a methodology that researchers could adopt to advance other streams of IT research.

Third, our study offers important specific recommendations for future research by developing a new theoretical model of IT turnover. As we elaborated in the paper, our review highlights three critical gaps in existing IT research on turnover. Specifically, existing IT research (1) focuses too much attention on IT turnover intention and not on the actual IT turnover behaviors, (2) lacks theoretical breadth, and (3) lacks attention on the moderating influence of the IT context on IT turnover. Accordingly, our model proposes directions for future research that links IT turnover intention to IT turnover behavior, incorporates new theoretical perspectives on IT turnover, and emphasizes contextual factors related to IT at different levels of analyses (Ang and Slaughter 2000; Cappelli and Sherer 1991). Through this model, we hope to guide future research toward a deeper understanding of the IT turnover phenomenon.

Practice Contributions

Results of this study inform managers of IT professionals about the factors that facilitate their retention. Specifically, our study not only shows that managing job satisfaction is important, but also highlights how to manage job satisfaction to retain valued IT professionals. The structural model indicates designing jobs that involve interactions with users and clients, and roles that are well-defined and consistent, can generally help increase job satisfaction for IT professionals. In contrast, providing high pay and good advancement prospects are not necessarily effective strategies to retain IT professionals, given the mixed results demonstrated in our MASEM.

Our study also offers insights on which groups of people are likely to leave. For instance, male IT professionals appear more inclined to leave the organization, in part due to lower job satisfaction, compared to their female counterparts. These results can help IT managers identify employees who are more at risk of leaving, and hence formulate appropriate strategies to retain them insofar as they are valued employees. In contrast, older IT professionals are less likely to quit even though they are less satisfied with the job, in part due to reduced job alternatives. As such, IT managers might devise strategies to redesign the jobs of more senior IT professionals.

Finally, our results indicate that turnover is just as likely for IT professionals with long tenure in organizations, and hence possessing valuable firm-specific human capital, as it is for new recruits. However, firm-specific human capital derived from long tenure within an organization is important for IT professionals to perform effectively at work, and it is costly for organizations to replace firm-specific human capital (Joseph 2006). As such, IT managers might opt for relational human resource strategies that invest in developing their IT professionals within a "community-based environment that provides employment security" in order to retain key talent (Ferratt et al. 2005 p. 246).

Conclusion

This paper sought to review and advance the IT turnover research through a narrative and quantitative review of the literature. Although the IT discipline has studied the IT turnover phenomenon for about 20 years, we believe this to be the first attempt at summarizing this body of knowledge. Beyond understanding the status quo, we proposed a model that can advance our collective understanding of IT turnover by highlighting three major directions for future research. First, future IT research should examine the turnover intention to turnover behavior link as quit intentions may not necessarily lead to actual turnover. Second, we hope that with the use of more recent theories and more rigorous research design, IT scholars can better inform the research and practice of managing the IT turnover phenomenon. Finally, we call for future research to theorize and test the influence of contextual factors, especially those specific to the IT profession, in the turnover processes and decisions of IT professionals.

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Appendix A

Moderator Analyses

As part of the meta-analysis, we conducted moderator analyses (Viswesvaran and Ones, 1995) to determine whether existing empirical results vary across different studies, and if so, to highlight the sources of variation.

Method

We coded study characteristics that may account for variation across studies. These characteristics, known as moderators, may potentially explain why inconsistent results across studies occur (Lipsey 1994). However, since moderator analysis requires all studies to provide information on a particular moderator, we could only code for the following moderators: age and gender proportion of the sample, conceptualization and operationalization of turnover intention, and operationalizations of antecedents of turnover intention. Specifically, for sample characteristics of age and gender proportions, we noted whether the mean age of a study's sample was under or over 40 years old, and whether the study's sample had 40 percent or more women (a sample is male dominant if the proportion of women IT professionals is less than 40 percent). These cut-off values were based on data from the Bureau of Labor Statistics, which reported that the average age of IT professionals was 40 years old, and that the average gender proportion was 60 percent male (Meares and Sargent 1999).

For turnover intention, we coded whether turnover intention was conceptualized as intention to stay or quit, and whether it was measured by single or multiple items (for implications of using single item measures, see Pedhazur and Schmelkin 1991). Likewise, the antecedents of IT turnover intention have been operationalized in multiple ways and hence were coded for these differences. Accordingly, we coded whether age and organization tenure were operationalized as actual years or as logarithmic transformation of years; whether pay was operationalized as a continuous or categorical scale; whether education differed on the number of categories used; whether role ambiguity and role conflict were operationalized using their original scale or were adapted or modified by dropping items; and whether organizational commitment was operationalized using the 15 or 9 item Organizational Commitment Questionnaire (OCQ, Porter et al. 1976) or non-OCQ scales (e.g. Meyer and Allen 1990; Mobley et al. 1978).

We identified the presence of moderators by computing a Q homogeneity statistic for all estimated population correlations. A significant Q statistic for a given relationship indicates that there is substantial variation in the effect sizes reported across studies. In such cases, we tested for variation by dividing the data into subsets grouped by the moderator variables described earlier. We then conducted separate meta-analyses of each subset and compared their estimated population correlations to see if they differ in the direction of the relationship. We also computed a Z statistic to statistically test if the characteristic used to divide the data is a moderator (Hunter and Schmidt 1990 p. 438).

Results

Results of the moderator analyses are summarized in Table 2. The Q homogeneity statistics in Table 2 indicate that the correlation estimates of seven antecedents of turnover intention did not vary substantially across studies. They are job and career satisfaction; individual attributes of IT tenure and marital status; and job-related factors of boundary spanning activities, workload, and work exhaustion. Results for the remaining 17 antecedents of turnover intention had significant variation, although 8 of these could not be examined for moderators because of insufficient number of studies. Hence, we conducted moderator analyses for the remaining nine antecedents. Tables A1 through A5 present the results for each of the potential moderators examined. We briefly describe results of these moderators below.

Mean Age of Sample: Results in Table A1 show that studies conducted on younger IT samples had significantly stronger relationships for turnover intention with organizational commitment, perceived job alternatives, education, and role ambiguity, but a weaker relationship with fairness of rewards. Age of the sample also affected the direction of the relationships for gender and organization tenure with turnover intention. We find a significant gender-turnover intention relationship for males in samples of younger IT professionals. The result for organization tenure indicates a significant negative relationship for samples with older IT professionals but a significant positive relationship for samples with younger IT professionals.

Gender Ratio of Sample: Results in Table A2 show that male-dominated IT samples yielded stronger relationships with turnover intention for education and role conflict but a weaker relationship for role ambiguity. The gender ratio of the sample also affected the direction of the relationship between organization tenure and turnover intention, but this relationship was not significant.

Conceptualization of Turnover Intent: The conceptualization of turnover intention as either intention to stay or quit was examined for organizational commitment and pay. Other antecedents could not be examined because there was either no variation in the conceptualization of turnover intention, or there was only one study with a different conceptualization. The results in Table A3 show that the conceptualization of turnover intention moderated only the effect of pay such that the relationship between pay and intention to stay was significantly stronger than that of intention to quit.

Operationalization of Turnover Intent: Results in Table A4 show that using a multiple-item measure of turnover intention yielded stronger relationships for organizational commitment, perceived job alternatives, and age, but a weaker relationship for education, compared to single-item turnover intention measures. Using different operationalizations of turnover intention also affected the direction of its relationships with organization tenure and gender.

Predictor Operationalizations: Results in Table A5 showed that the relationship between organizational commitment and turnover intention was stronger when non-OCQ measures were used, compared to OCQ measure. Of the studies that used OCQ, results showed that the 15-item OCQ measure yielded stronger effect sizes than the 9-item OCQ measure. Results also showed that a multiple-item measure of perceived job alternatives produced a stronger correlation with turnover intention than a single-item scale.

Different operationalizations of organization tenure (actual number of years or its log transformation) and pay (categorical or continuous scale) affected the direction of their relationships with turnover intention. Different operationalizations of age (actual calendar years or its logarithmic function) and education (number of categories used) affected the strength of their relationships with turnover intention. For job related factors, operationalizing role conflict with Rizzo et al.'s (1970) original items yielded significantly lower correlations with turnover intention, compared to modified measures. No difference was found for modifying the role ambiguity scale.

Discussion and Conclusion

The results of the moderator analyses shed some light on the nonsignificant relationships for some antecedents with turnover intention. For instance, our moderator analyses which showed that young male IT professionals were more likely to leave compared to young female IT professionals may explain why gender did not have a significant bivariate relationship with turnover intention. Likewise, organization tenure did not have a significant relationship with turnover intention possibly because its effect depended on the age of IT professionals. Our results showed that organization tenure had a positive relationship with turnover intention in samples of younger IT professionals, but a negative relationship in samples of older IT professionals, perhaps because younger IT professionals have less sunk costs or fewer problems with adjusting to a new workplace than older ones.

A limitation of the moderator analyses in our study arises from the relatively small number of studies. We could not explain the significant variation in eight antecedents of IT professional turnover intention due to an insufficient number of studies. Nonetheless, we note that other meta-analyses in niche IT domains also had small sample sizes (e.g., Dennis and Wixom 2002; Montazemi and Wang 1989).

Table A1. Moderating Role of Mean Age of Sample in the Relationship between Antecedents and Turnover Intention

Antecedents	K	N	ρ	95% Confidence Interval		Q	Z
				Lower	Upper		
Organizational Commitment							
Below 40 years	7	1,141	-0.55*	-0.71	-0.40	64.68***	3.64***
40 years and above	5	1,267	-0.37*	-0.51	-0.23	34.30***	
Perceived Job Alternatives							
Below 40 years	2	219	0.43*	0.35	0.51	1.02	10.85***
40 years and above	2	657	0.25*	0.08	0.43	9.70***	
Gender							
Below 40 years	7	1,207	-0.06*	-0.12	-0.01	5.48	10.95***
40 years and above	3	1,544	0.11	-0.03	0.24	21.07***	
Education							
Below 40 years	4	664	0.06	-0.06	0.17	8.85***	4.36***
40 years and above	2	1,196	0.01	-0.07	0.10	4.36	
Organization Tenure							
Below 40 years	7	1,346	0.08*	0.01	0.15	11.04	12.14***
40 years and above	4	1,796	-0.20*	-0.35	-0.06	39.54***	
Role Ambiguity							
Below 40 years	7	1,366	0.30	0.20	0.37	16.71***	2.44*
40 years and above	3	1,064	0.11	-0.19	0.42	64.35***	
Role Conflict							
Below 40 years	7	1,366	0.30*	0.19	0.42	30.25***	0.41
40 years and above	3	1,064	0.29*	0.24	0.35	2.18	
Fairness of Rewards							
Below 40 years	3	524	-0.35*	-0.39	-0.30	0.96	2.13*
40 years and above	2	445	-0.41	-0.66	-0.16	16.05***	
Pay							
Below 40 years	2	212	-0.08*	-0.59	0.43	56.73***	0.45
40 years and above	4	1,656	-0.14	-0.29	0.00	34.69***	

K = Number of studies; N = Number of observations; ρ = Corrected population correlation; Q = Chi-quare test for moderators; Z = Z statistic for the critical ratio (Z = 1.96, $p = 0.05$; two-tailed test) that indicates whether moderator subgroups are significantly different.
*$p < 0.05$; **$p = 0.01$; ***$p = 0.001$

Table A2. Moderating Role of Gender Ratio of Sample in the Relationship between Antecedents and Turnover Intention

Antecedents	K	N	ρ	95% Confidence Interval		Q	Z
				Lower	Upper		
Organizational Commitment							
Proportionate sample	6	954	-0.52*	-0.69	-0.35	53.66***	1.83
Male dominant sample	6	1,463	-0.41*	-0.56	-0.26	60.18***	
Age							
Proportionate sample	5	1,382	-0.07*	-0.14	-0.00	8.06	0.45
Male dominant sample	5	1,046	-0.11	-0.34	0.13	83.64***	
Education							
Proportionate sample	3	1,017	0.00	-0.04	0.04	1.14	3.97***
Male dominant sample	3	843	0.09	-0.04	0.21	8.70*	
Organization Tenure							
Proportionate sample	5	1,382	0.02	-0.06	0.09	8.81	3.62***
Male dominant sample	6	1,760	-0.16	-0.33	0.02	80.91***	
Role Ambiguity							
Proportionate sample	4	589	0.36	-0.04	0.04	3.95	3.97***
Male dominant sample	6	1,841	0.16	-0.04	0.21	75.22***	
Role Conflict							
Proportionate sample	4	586	0.20*	0.28	0.45	8.06*	5.93***
Male dominant sample	6	1,841	0.33	-0.01	0.34	17.63**	
Fairness of Rewards							
Proportionate sample	2	365	-0.35*	-0.42	-0.28	0.93	1.55
Male dominant sample	3	604	-0.39*	-0.57	-0.21	15.48***	

K = Number of studies; N = Number of observations; ρ = Corrected population correlation; Q = Chi-quare test for moderators; Z = Z statistic for the critical ratio (Z = 1.96, $p = 0.05$; two-tailed test) that indicates whether moderator subgroups are significantly different.
*$p < 0.05$; **$p = 0.01$; ***$p = 0.001$

Table A3. Moderating Role of Conceptualization of Turnover Intention in the Relationship between Antecedents and Turnover Intention

Antecedents	K	N	ρ	95% Confidence Interval		Q	Z
				Lower	Upper		
Organizational Commitment							
Intent to Stay	2	460	-0.52*	-0.55	-0.50	0.17	1.61
Intent to Quit	10	1,957	-0.44*	-0.58	-0.30	117.83***	
Pay							
Intent to Stay	2	460	-0.28*	-0.36	-0.20	1.42	5.13***
Intent to Quit	4	1,408	-0.09	-0.28	0.10	66.54***	

K = Number of studies; N = Number of observations; ρ = Corrected population correlation; Q = Chi-quare test for moderators; Z = Z statistic for the critical ratio (Z = 1.96, $p = 0.05$; two-tailed test) that indicates whether moderator subgroups are significantly different.
*$p < 0.05$; **$p = 0.01$; ***$p = 0.001$

Table A4. Moderating Role of Measurement of Turnover Intent in the Relationship between Antecedents and Turnover Intention

Antecedents	K	N	ρ	95% Confidence Interval		Q	Z
				Lower	Upper		
Organizational Commitment							
Single item	4	1,083	-0.35*	-0.52	-0.19	31.97***	3.92***
Multiple item	8	1,334	-0.54*	-0.67	-0.40	65.18***	
Perceived Job Alternatives							
Single item	2	489	0.20*	0.06	0.33	5.05*	23.92***
Multiple item	2	387	0.43*	0.40	0.46	0.17	
Age							
Single item	3	1,221	-0.02	-0.09	0.05	5.10	2.43*
Multiple item	7	1,207	-0.16	-0.33	0.02	68.76***	
Gender							
Single item	4	1,712	0.10	-0.02	0.22	21.87***	11.46***
Multiple item	6	1,039	-0.07*	-0.13	-0.01	4.80	
Education							
Single item	2	1,196	0.06	-0.06	0.17	7.52***	4.36***
Multiple item	4	664	0.01	-0.07	0.10	4.36	
Organization Tenure							
Single item	3	1,544	-0.19*	-0.39	-0.02	37.60***	6.40***
Multiple item	8	1,598	0.03	-0.08	0.14	36.40***	
Role Ambiguity							
Single item	2	812	0.26*	0.25	0.27	0.01	1.03
Multiple item	8	1,618	0.19*	0.01	0.37	94.50***	
Role Conflict							
Proportionate sample	2	812	0.28*	0.22	0.33	1.10	1.60
Male dominant sample	8	1,618	0.31*	0.21	0.42	30.88***	

K = Number of studies; N = Number of observations; ρ = Corrected population correlation; Q = Chi-quare test for moderators; Z = Z statistic for the critical ratio (Z = 1.96, $p = 0.05$; two-tailed test) that indicates whether moderator subgroups are significantly different.
*$p < 0.05$; **$p = 0.01$; ***$p = 0.001$

Table A5. Moderating Role of Operationalization of Antecedents in the Relationship with Turnover Intention

Antecedents	K	N	ρ	95% Confidence Interval		Q	Z
				Lower	Upper		
Organizational Commitment							
Non-OCQ scales	3	440	-0.53*	-0.73	-0.33	14.73***	2.85**
OCQ measures	9	1,977	-0.44*	-0.58	-3.30	103.89***	
15-item OCQ	4	576	-0.58*	-0.73	-0.44	17.66***	3.20**
9-item OCQ	5	1,401	-0.38*	-0.55	-0.21	61.69***	
Perceived Job Alternatives							
Single item measure	2	489	0.20*	0.06	0.33	5.05*	23.92***
Multiple item measure	2	387	0.43*	0.40	0.46	0.17	
Age							
Years	8	2,143	-0.08	-0.21	0.06	84.05***	2.14*
Log of years	2	285	-0.16*	-0.20	-0.12	0.26	
Education							
4 or less levels	3	1,071	0.00	-0.04	0.04	1.14	7.22***
5 or more levels	3	843	0.09	-0.04	0.21	8.70*	
Organization Tenure							
Years	9	2,857	-0.09	-0.22	0.04	105.39***	3.31***
Log of years	2	285	0.04*	0.02	0.05	0.02	
Role Ambiguity							
Original scale	6	1,202	0.17	-0.06	0.39	81.73***	1.12
Adapted scale	4	1,228	0.26*	0.16	0.36	10.97	
Role Conflict							
Original scale	6	1,202	0.28*	0.17	0.38	17.47**	2.04**
Adapted scale	4	1,228	0.32*	0.21	0.43	13.94***	
Pay							
Categorical variable	4	1,111	-0.26*	-0.30	-0.22	2.07	10.95***
Continuous variable	2	757	0.05	-0.18	0.28	37.10***	

K = Number of studies; N = Number of observations; ρ = Corrected population correlation; Q = Chi-quare test for moderators; Z = Z statistic for the critical ratio (Z = 1.96, $p = 0.05$; two-tailed test) that indicates whether moderator subgroups are significantly different.
*$p < 0.05$; **$p = 0.01$; ***$p = 0.001$